CLAIMS

At least the following is claimed:

1. A transmitter, comprising:

(a) first and second convolutional encoders;

(b) first and second inputs connected to said first and second convolutional encoders respectively;

(c) first and second outputs; and

(d) a switch designed to perform the following alternatively during successive baud periods:

(1) connect said first input to said first output through said first convolutional encoder while connecting said second input to said second output through said second convolutional encoder during said baud period; and

(2) connect said first input to said second output through said first convolutional encoder while connecting said second input to said first output through said second convolutional encoder.

2. The transmitter of claim 1, wherein said first and second convolutional encoders are trellis encoders.

3. The transmitter of claim 1, wherein said first and second outputs are each wire pairs.

4. The transmitter of claim 1, wherein said convolutional encoders and said switch are implemented with software that is executed with a processor.

5. The transmitter of claim 1, further comprising first and second mappers connected between said first and second convolutional encoders and said first and second outputs, respectively, said first and second mappers configured to receive first and second data symbols, respectively, and define therefor first and second pluralities of bits, respectively, said first and second pluralities being equal or different in number so that data rates associated with said first and second outputs can be defined as equal or different.

6. The transmitter of claim 1, further comprising first and second modulators connected to said first and second convolutional encoders for encoding digital data upon an analog signal for communication onto said first and second outputs, respectively.

7. The transmitter of claim 1, wherein said first and second inputs are connected to the same data terminal equipment.

8. A transmitter, comprising:

means for convolutionally encoding each data stream of a plurality;

means for interleaving data segments from said convolutionally encoded data streams; and

means for communicating said interleaved convolutionally-encoded data streams to a plurality of separate communication paths.

9. The transmitter of claim 8, further comprising first and second pluralities of convolutional encoding means for convolutionally encoding first and second data streams, respectively, so that each of said communicated data streams comprise data segments from each of said convolutional encoding means.

10. The transmitter of claim 8, wherein said convolutional encoding means is a single convolutional encoder designed to process and encode said plurality of data streams.

11. The transmitter of claim 8, further comprising a switching means for alternatively performing steps (1) and (2) hereafter during successive baud periods:

(1) connecting a first input to a first output through a first convolutional encoder while connecting a second input to a second output through a second convolutional encoder during said baud period; and

(2) connecting said first input to said second output through said first convolutional encoder while connecting said second input to said first output through said second convolutional encoder.

12. The transmitter of claim 11, further comprising:

means for receiving first and second symbols from said first and second outputs, respectively; and

means for independently defining first and second data rates for said first and second outputs by defining first and second pluralities of bits for said first and second symbols, respectively, said first and second pluralities being equal or different in number so that said first and second data rates associated with said first and second outputs can be defined to be equal or different.

13. The transmitter of claim 8, wherein said convolutional encoding means performs trellis encoding.

14. The transmitter of claim 8, wherein said separate communication paths are each wire pairs.

15. The transmitter of claim 8, wherein said convolutional encoding means is implemented with software that is executed with a processing means.

16. The transmitter of claim 8, further comprising means for independently defining data rates on said paths by separately defining a number of bits for each of said interleaved data segments.

17. A method for transmitting data, comprising the steps of:

receiving a plurality of data streams;

convolutionally encoding each of said data streams of said plurality;

interleaving data segments from said convolutionally encoded data streams; and

transmitting said interleaved convolutionally-encoded data streams onto a plurality of separate communication paths.

18. The method of claim 17, further comprising the step of convolutionally encoding said plurality of said data streams with greater than two convolutional encoders so that said transmitted data streams comprise data segments from each of said greater than two convolutional encoders.

19. The method of claim 17, wherein the step for convolutional encoding uses a single convolutional encoder to encode said plurality of data streams.

20. The method of claim 17, further comprising the steps of:

alternatively performing steps (1) and (2) hereafter during successive baud periods:

(1) connecting a first input to a first output through a first convolutional encoder while connecting a second input to a second output through a second convolutional encoder during said baud period; and

(2) connecting said first input to said second output through said first convolutional encoder while connecting said second input to said first output through said second convolutional encoder.

21. The method of claim 17, further comprising the steps of:

receiving first and second symbols from said first and second outputs, respectively; and

independently defining first and second data rates for said first and second output by selectively defining first and second pluralities of bits for said first and second symbols, respectively, said first and second pluralities being equal or different in number so that said first and second data rates associated with said first and second output can be defined to be equal or different.

22. The method of claim 17, wherein said step of convolutional encoding includes the step of performing trellis encoding.

23. The method of claim 17, wherein said communication paths are each wire pairs.

24. The method of claim 17, wherein said step of convolutional encoding is implemented with software that is executed with a processor.

25. The method of claim 17, further comprising the step of independently defining data rates on said paths by separately defining a number of bits for each of said interleaved data segments.

26. A receiver, comprising:

(a) first and second convolutional decoders;

(b) first and second inputs connected to said first and second convolutional decoders respectively;

(c) first and second outputs; and

(d) a switch designed to perform the following alternatively during successive baud periods:

(1) connect said first input to said first output through said first convolutional decoder while connecting said second input to said second output through said second convolutional decoder during said baud period; and

(2) connect said first input to said second output through said first convolutional decoder while connecting said second input to said first output through said second convolutional decoder.

27. The receiver of claim 26, wherein said first and second convolutional decoders are trellis decoders.

28. The receiver of claim 26, wherein said first and second inputs are each wire pairs.

29. The receiver of claim 26, wherein said convolutional decoders and said switch are implemented with software that is executed with a processor.

30. The receiver of claim 26, further comprising first and second demappers connected between said first and second convolutional decoders and said first and second outputs, respectively, said first and second demappers configured to receive first and second sets of bits, respectively, and define therefor first and second pluralities of bits, respectively, said first and second pluralities being equal or different in number so that data rates associated with said first and second outputs can be defined as equal or different.

31. The receiver of claim 26, further comprising first and second demodulators connected to said first and second convolutional decoders for demodulating digital data from an analog signal received on said first and second inputs, respectively.

32. The receiver of claim 26, wherein said first and second outputs are connected to the same data terminal equipment.

33. The receiver of claim 26, wherein said first and second outputs are connected to separate first and second data terminal equipment.

34. A receiver, comprising:

means for de-interleaving data segments received from a plurality of separate communication paths into a plurality of data streams; and

means for convolutionally decoding each of said de-interleaved data streams.

35. The receiver of claim 34, further comprising more than one convolutional decoding means for each of said data streams and wherein different convolutional decoding means are utilized during successive baud periods for convolutionally decoding each of said data streams.

36. The receiver of claim 34, wherein said convolutional decoding means is a single convolutional decoder designed to process and decode said plurality of data streams.

37. The receiver of claim 34, further comprising a switching means for alternatively performing steps (1) and (2) hereafter during successive baud periods:

(1) connecting a first input to a first output through a first convolutional decoder while connecting a second input to a second output through a second convolutional decoder during said baud period; and

(2) connecting said first input to said second output through said first convolutional decoder while connecting said second input to said first output through said second convolutional decoder.

38. The receiver of claim 37, further comprising:

means for receiving first and second symbols from said first and second inputs, respectively; and

means for permitting first and second data rates on said first and second inputs by defining first and second pluralities of bits for said first and second symbols, respectively, said first and second pluralities being equal or different in number so that said first and second data rates associated with said first and second inputs can be defined to be equal or different.

39. The receiver of claim 34, wherein said convolutional decoding means performs trellis decoding.

40. The receiver of claim 34, wherein said separate communication paths are each wire pairs.

41. The receiver of claim 34, wherein said convolutional decoding means is implemented with software that is executed with a processing means.

42. The receiver of claim 34, further comprising a means for independently defining data rates on said paths by separately defining a number of bits for each of said interleaved data segments.

43. A method for receiving data, comprising the steps of:

receiving a plurality of data streams from separate communication paths;

de-interleaving data segments from said convolutionally decoded data streams; and

convolutionally decoding each of said de-interleaved data streams of said plurality.

44. The method of claim 43, further comprising the step of convolutionally decoding said plurality of said data streams with greater than two convolutional decoders.

45. The method of claim 43, wherein the step for convolutional decoding uses a single convolutional decoder to decode said plurality of data streams.

46. The method of claim 43, further comprising the steps of:

alternatively performing steps (1) and (2) hereafter during successive baud periods:

(1) connecting a first input to a first output through a first convolutional decoder while connecting a second input to a second output through a second convolutional decoder during said baud period; and

(2) connecting said first input to said second output through said first convolutional decoder while connecting said second input to said first output through said second convolutional decoder.

47. The method of claim 46, further comprising the steps of:

receiving first and second symbols from said first and second inputs, respectively; and

permitting first and second data rates on said first and second inputs by selectively defining first and second pluralities of bits for said first and second symbols, respectively, said first and second pluralities being equal or different in number so that said first and second data rates associated with said first and second inputs can be defined to be equal or different.

48. The method of claim 43, wherein said step of convolutional decoding includes the step of performing trellis decoding.

49. The method of claim 43, wherein said communication paths are each wire pairs.

50. The method of claim 43, wherein said step of convolutional decoding is implemented with software that is executed with a processor.

51. The method of claim 43, further comprising the step of permitting the same or different data rates on said paths by separately defining the same or a different number of bits, respectively, for each of said de-interleaved data segments.

52. The method of claim 43, further comprising the step of introducing a delay into one of said paths, so that data on said paths is aligned in time and can be de-interleaved.

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53. A transmitter, comprising:

(a) first and second convolutional encoders;

(b) first and second inputs connected to said first and second convolutional encoders respectively;

(c) first and second outputs; and

(d) a switch designed to perform the following alternatively during successive baud periods:

(1) connect said first input to said first output through said first convolutional encoder while connecting said second input to said second output through said second convolutional encoder during said baud period; and

(2) connect said first input to said first output through said second convolutional encoder while connecting said second input to said second output through said first convolutional encoder.

54. A receiver, comprising:

(a) first and second convolutional decoders;

(b) first and second inputs connected to said first and second convolutional decoders respectively;

(c) first and second outputs; and

(d) a switch designed to perform the following alternatively during successive baud periods:

(1) connect said first input to said first output through said first convolutional decoder while connecting said second input to said second output through said second convolutional decoder during said baud period; and

(2) connect said first input to said first output through said second convolutional decoder while connecting said second input to said second output through said first convolutional decoder during said baud period.

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